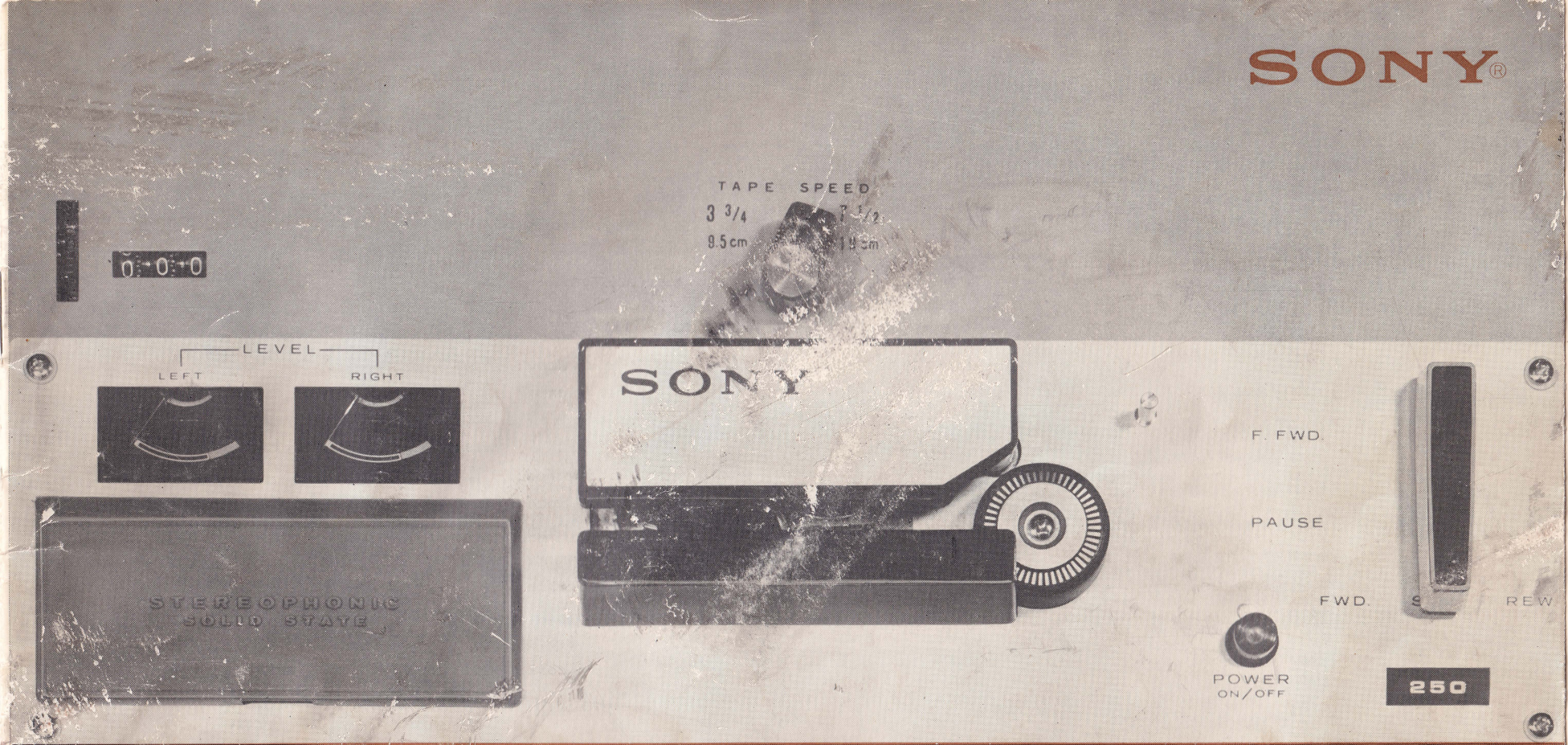
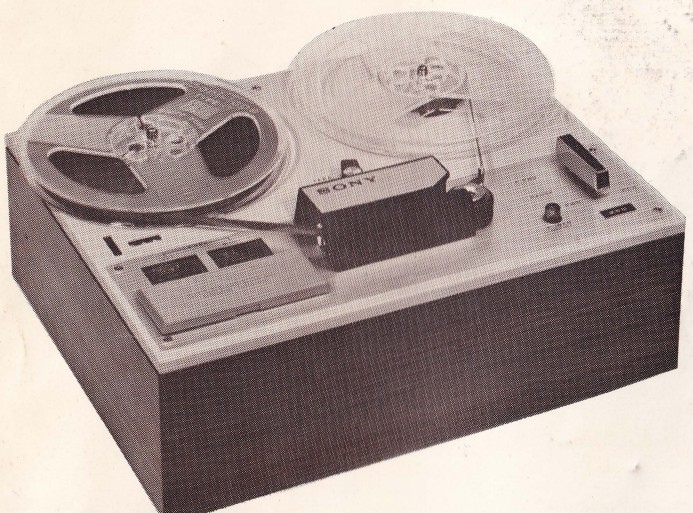
SONY®



STEREO TAPECORDER MODEL TC-250

OWNER'S INSTRUCTION MANUAL



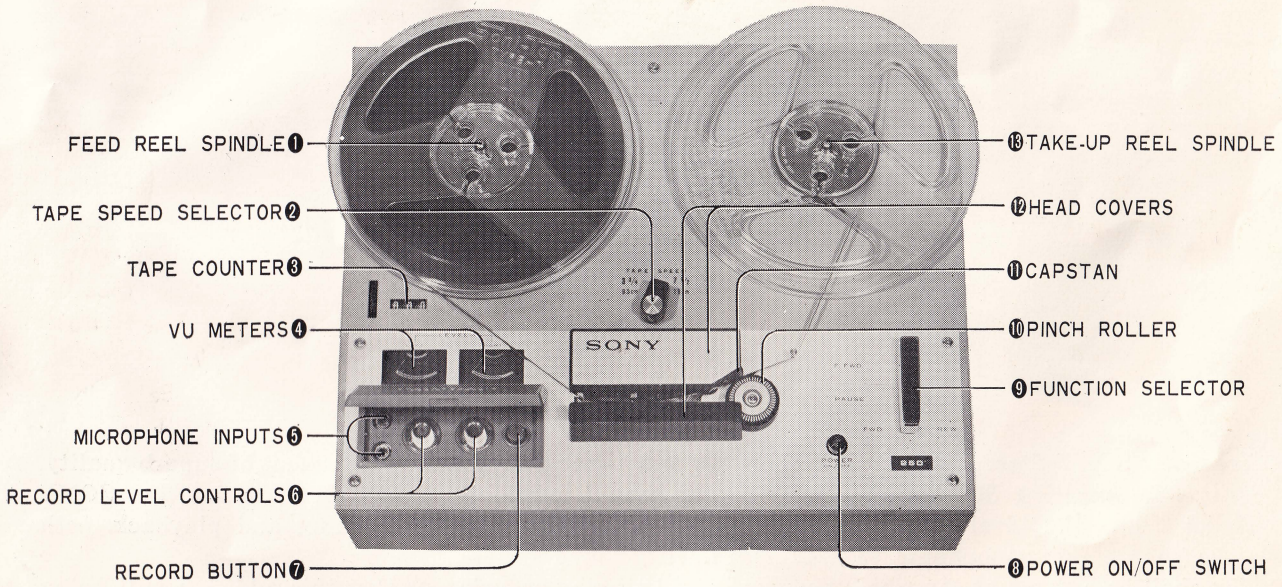
Your new SONY Stereo Tapecorder Model 250 is a 4-track, solid state instrument of superb quality, built with exacting SONY precision. Easy to mount, efficiently simple in operation, the SONY Model 250 is the ideal component to add the dimension of tape-recording and playback, both stereophonic and monophonic, to your high fidelity sound system.

You shall be amazed at the whole new world of listening experiences that this addition will bring to you.

Read the information contained in this manual carefully before operating the tape recorder.

Save this manual for future reference.

Diagram of Controls



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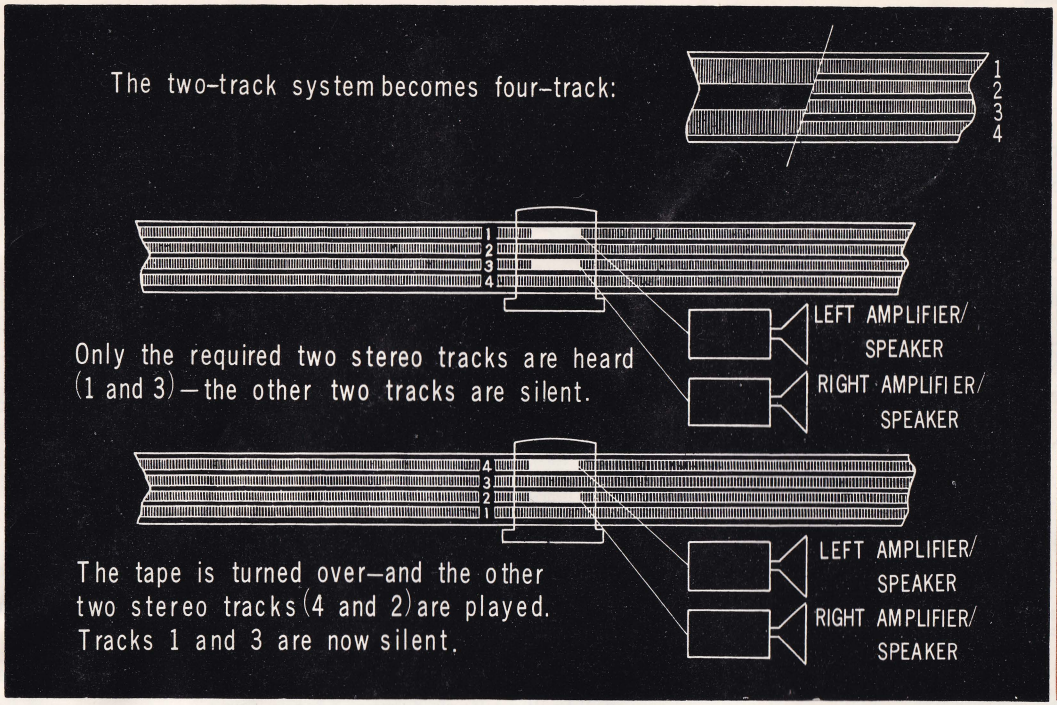
Technical Specifications

Power Requirement:	40 watts, 117 volts, 60 cycles
Tape Speeds:	Instantaneous selection 7½ ips or 3¾ ips (19 or 9.5 centimeters per second)
Frequency Response:	30-18,000 c/s at 7½ ips ±3 db 50-15,000 c/s at 7½ ips 30-13,000 c/s at 3¾ ips
Signal-to-Noise Ratio (Per Channel):	Better than 50 db
Flutter and Wow:	Less than 0.19% at 7½ ips Less than 0.25% at 3¾ ips
Harmonic Distortion:	1% at 0 db line output
Erase Head:	In-line (stacked) quarter track, EF17-2902H
Record/Playback Head:	In-line (stacked) quarter track, PP30-4202
Bias Frequency:	Approx. 55 Kc
Level Indication:	Two VU meters (calibrated to 0 db at 12 db below saturation)
Inputs:	Low impedance microphone inputs—Transistorized (will accommodate any Microphone from 250-1K ohm impedance) Sensitivity —72 db (0.2 mv) High Impedance auxiliary inputs Sensitivity —12 db (0.2 v)
Output:	Low impedance line outputs
Transistors:	2SD64 (× 6), 2SB382 (× 2), 2SB383 (× 2)
Weight:	Approx. 15.4 lbs.
Dimensions:	14.2″W × 11.4″D × 6.3″H


The two-track system becomes four-track:
1
2
3
4
Only the required two stereo tracks are heard (1 and 3)—the other two tracks are silent.
LEFT AMPLIFIER/ SPEAKER
RIGHT AMPLIFIER/ SPEAKER
The tape is turned over—and the other two stereo tracks (4 and 2) are played. Tracks 1 and 3 are now silent.
LEFT AMPLIFIER/ SPEAKER
RIGHT AMPLIFIER/ SPEAKER

HOW FOUR-TRACK WORKS

Chart courtesy of
MAGNETIC RECORDING INDUSTRY ASSOCIATION

What is 4-Track Stereo

4-Track Stereo is the method in which twice as much recorded material can be obtained on 1/4" magnetic tape by recording 2 separate pairs of stereo tracks on the tape.

In order to accomplish this, the size and spacing of the magnetic head poles had to be changed to conform with the placement of 4-Tracks within the area of 1/4" tape.

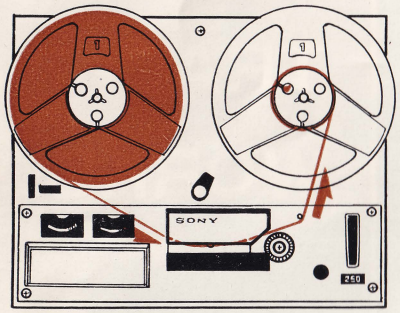
The above diagram shows the comparison of track placement between 2-Track stereo and 4-Track stereo.

Playback Procedure

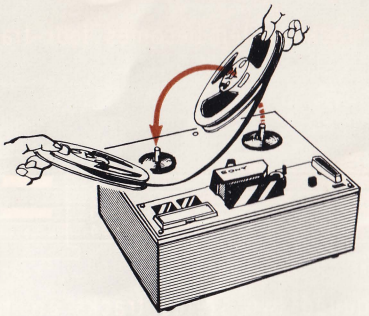
To Play Back 4-Track Stereo Tape

Before playing back the tape, connect LEFT (channel 1) and RIGHT (channel 2) LINE OUTPUT jacks of the recorder to respective channel input jacks of any integrated stereo amplifier. (See LINE OUTPUTS, page 7.)

1. Thread 4-track pre-recorded tape with Side 1 of the tape (tracks 1 and 3) facing up.



2. Set the recorder in recommended speed of the recorded tape to be played.
3. Turn the Function Selector ❾ to FWD. (Playback output is obtained without passing through level control of the recorder.)
4. When the end of the tape is reached, tracks 1 and 3 will have been played back (see 4-track diagram, page 1).
5. For playback of Side 2 of the tape (tracks 4 and 2), do not rewind. The loaded take-up reel is inverted and placed on the feed spindle ❶, and the empty reel is placed on the take-up spindle ⓭.

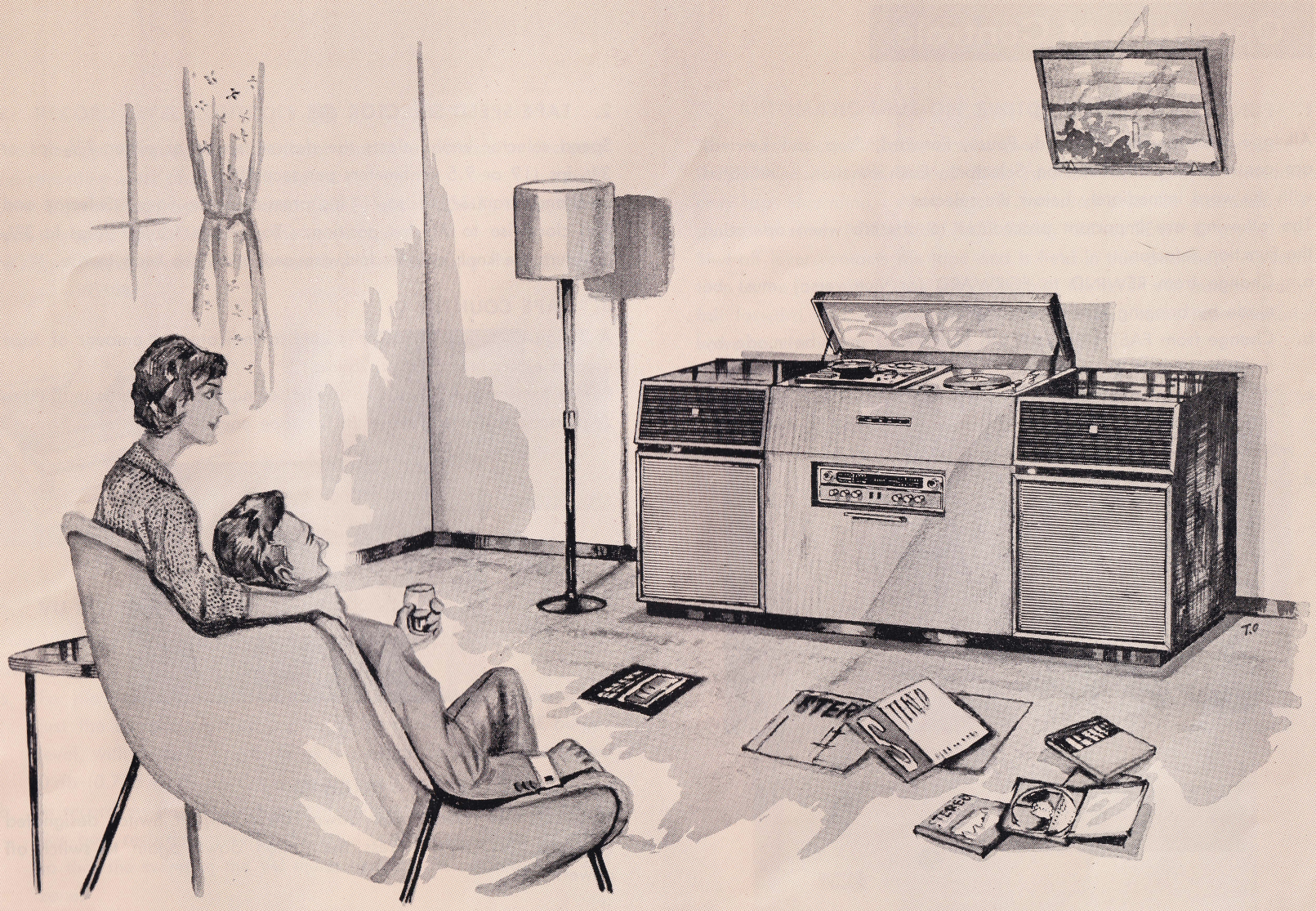


6. Thread tape on the mechanism again and repeat operation 3.

To Play Back 4-Track Monophonic Tape

The following playback procedure is recommended for a monophonic tape whose sequence of recording is; track 1—track 4—track 3—track 2.

1. Connect the recorder with any integrated amplifier as described in "To Play Back 4-Track Stereo Tape".
2. For playback of track 1 of the tape, turn right (channel 2) volume control of the integrated amplifier to zero and turn the Function Selector ❾ to FWD.
3. Track 4 will also be played back by simply reversing and inverting the reels.
4. For playback of tracks 3 and 2 of the tape, turn left (channel 1) volume control of the integrated amplifier to zero and turn the Function Selector to FWD.



Recording Procedure

4-Track Stereo Recording

1. Thread tape on the recorder and select desired tape speed.
2. Connect stereo source to proper inputs on LEFT and RIGHT channels. (See page 7.)
3. Keeping Record Button ❼ depressed, turn the Function Selector ❾ to PAUSE. Adjust Record Level Controls ❻ for desired recording level. (See VU Meters, page 5.)
4. Turn the Function Selector ❾ to FWD.
5. When the end of the tape is reached, tracks 1 and 3 will have been recorded.
6. To record tracks 4 and 2, do not rewind. Reverse reels. (The loaded take-up reel is inverted and placed on the feed spindle ❶, and the empty reel is placed on the take-up spindle ⓭.)
7. Thread the tape on the mechanism again and repeat operations 2, 3 and 4.

4-Track Monophonic Recording

To record track 1 of the tape, turn RIGHT (channel 2) Record Level Control to zero. Track 4 will have been recorded by simply reversing and inverting the reels.

Tracks 3 and 2 can not be recorded in succession of tracks 1 and 4; however, tracks 3 and 2 can be recorded by turning LEFT (channel 1) Record Level Control to zero and thereby erasing recordings on tracks 1 and 4.

Input and Output Connectors

1. MICROPHONE INPUTS ⑤

Two Microphone jacks are of the mini-type and will accept mini-plugs. The Microphone input impedance is approx. 600 ohm and will accept the SONY F-96 microphone, or any high quality dynamic microphone of the low impedance variety can be used.

The input can also be used for recording from any component that delivers a signal from 0.2 mv to 0.25 v, such as telephone pick-up, low level detector output, etc.

2. AUXILIARY INPUTS

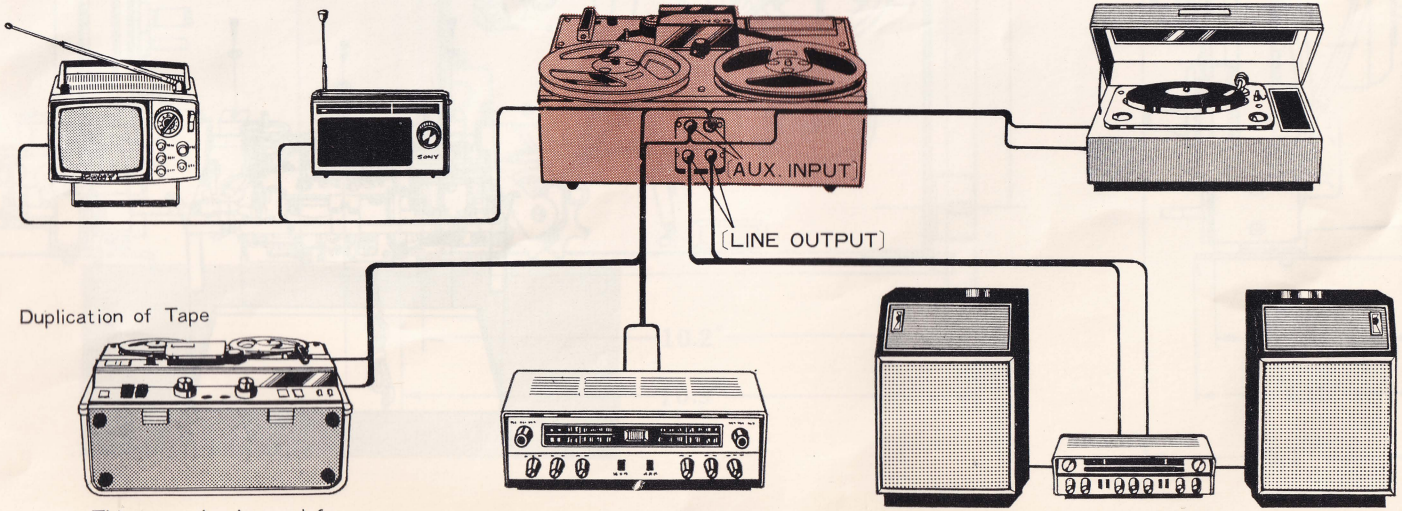
Located at the rear side of the recorder, the phono-type auxiliary inputs are designated 〔AUX. INPUT〕.

These input jacks are high impedance (approx. 10K ohms) and are used for recording from any component that delivers a signal of more than 0.2 v, such as; AM/FM tuners, TV, tape recorders, pre-amplifier "recorder" outputs, crystal phono cartridges, etc.

3. LINE OUTPUTS

Designated 〔LINE OUTPUT〕, the phono-type jacks are used to connect the recorder to auxiliary input or line input jacks of any integrated amplifier. (For connection use SONY Connecting Cord RK-56, supplied as an accessory.)

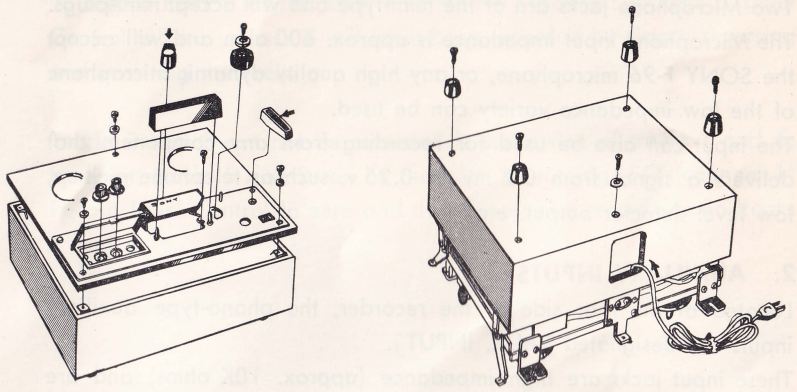
These output jacks, with a load impedance of more than 5K ohms, deliver approx. 0 db (0.775 v) output levels per channel when the VU Meter needle points to the boundary between the black and red zones.

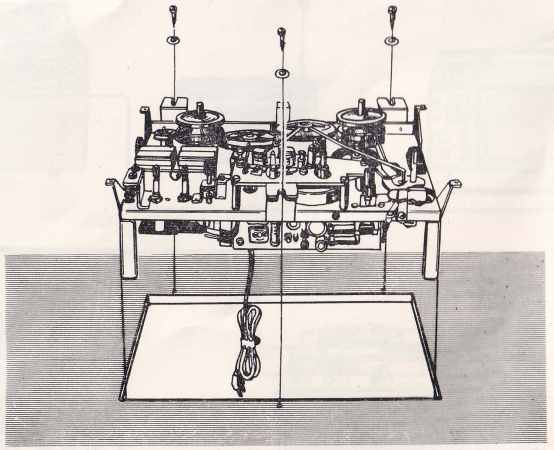


How to Mount Model 250

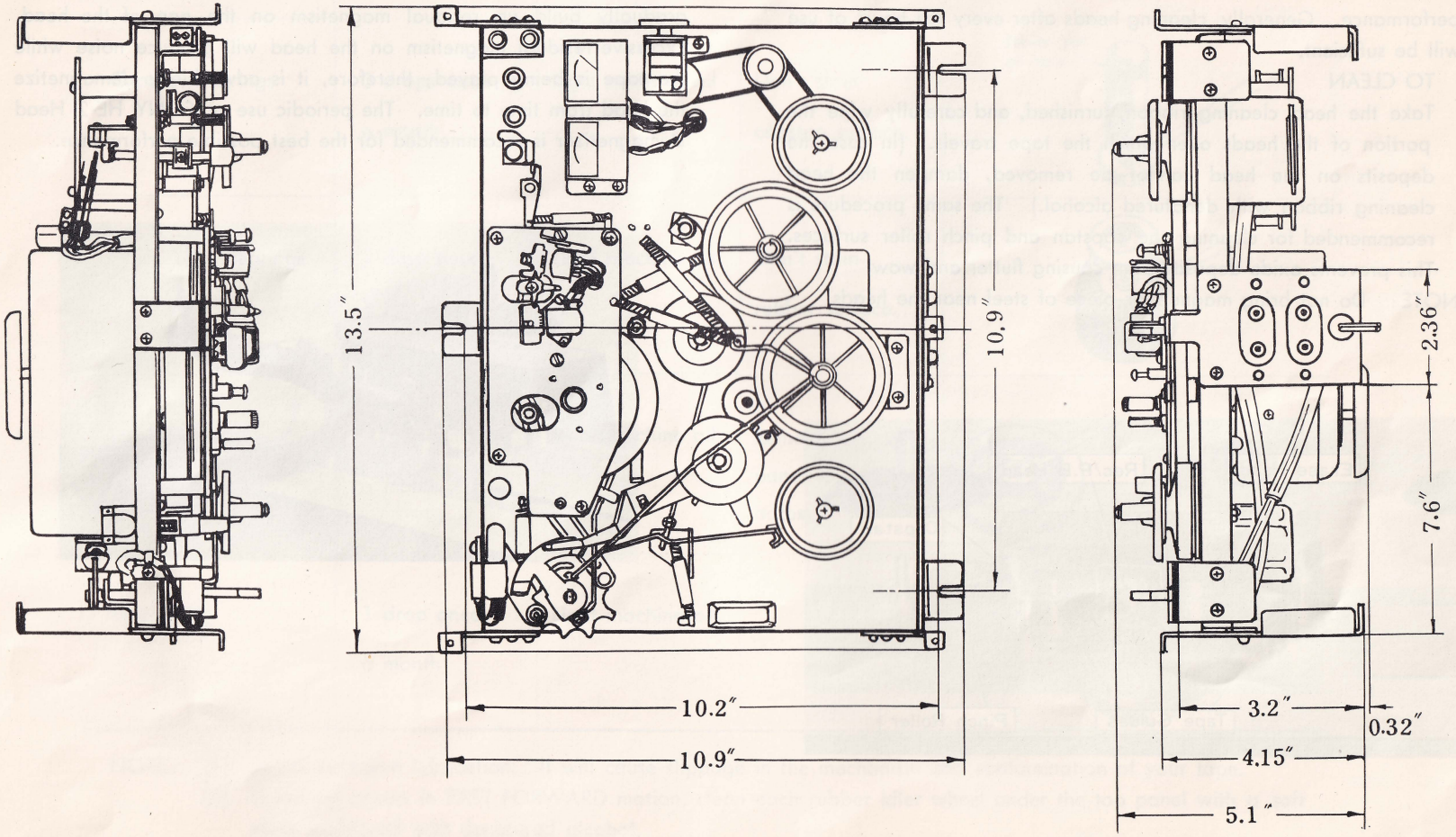
NOTE: Install so that the recorder is horizontal, or not more than 30 degrees from horizontal.

1. Make an opening of 13.4 × 10.2 inches on the board where the recorder is to be mounted.
2. Remove Function Selector lever, Speed Selector knob, Head cover, two Level Control knobs, Pinch Roller and four mounting screws from the top panel and lift up the panel.
3. Remove the recorder cabinet by unscrewing (counterclockwise) four rubber bases and a screw from the bottom plate.
4. Install the main chassis in the opening on the board with three wood screws (4 × 6 mm).
5. Place the top panel on top of the main chassis and replace the parts removed in Step 2.





Mounting Dimensions



Maintenance

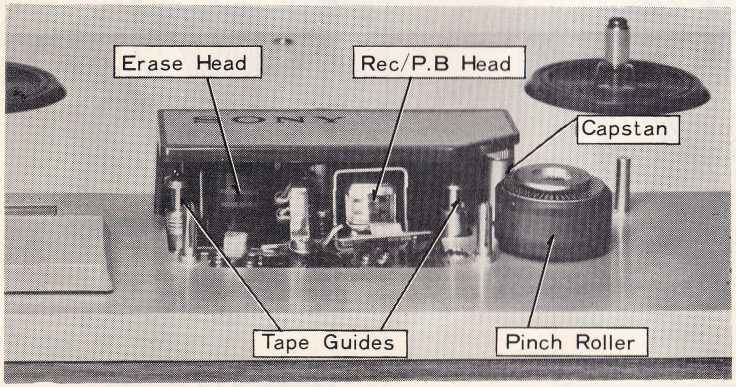
CLEANING HEADS

Intimate contact between heads and tape is important for optimum performance. Generally, cleaning heads after every ten hours of use will be sufficient.

TO CLEAN

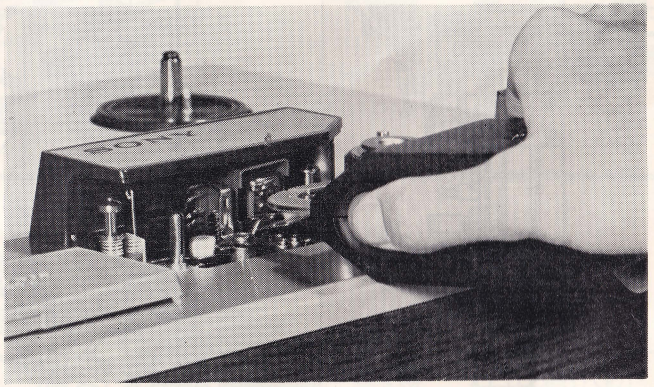
Take the head cleaning ribbon, furnished, and carefully wipe the portion of the heads over which the tape travels. (In case the deposits on the head cannot be removed, dampen the head cleaning ribbon with denatured alcohol.) The same procedure is recommended for cleaning the capstan and pinch roller surfaces. This prevents oxide deposits from causing flutter and wow.

NOTE: Do not bring magnets or piece of steel near the heads.

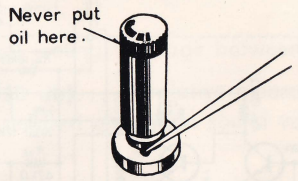
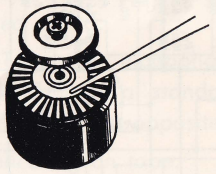
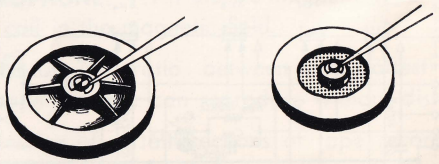
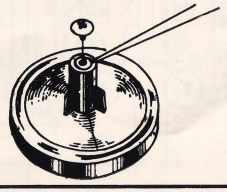


DEMAGNETIZING HEADS

Through continuous use, the varying magnetic fields of the tape will gradually build up residual magnetism on the gap of the head. Excessive residual magnetism on the head will produce noise while the tape is being played; therefore, it is advisable to demagnetize the head from time to time. The periodic use of SONY HE-2 Head Demagnetizer is recommended for the best possible performance.

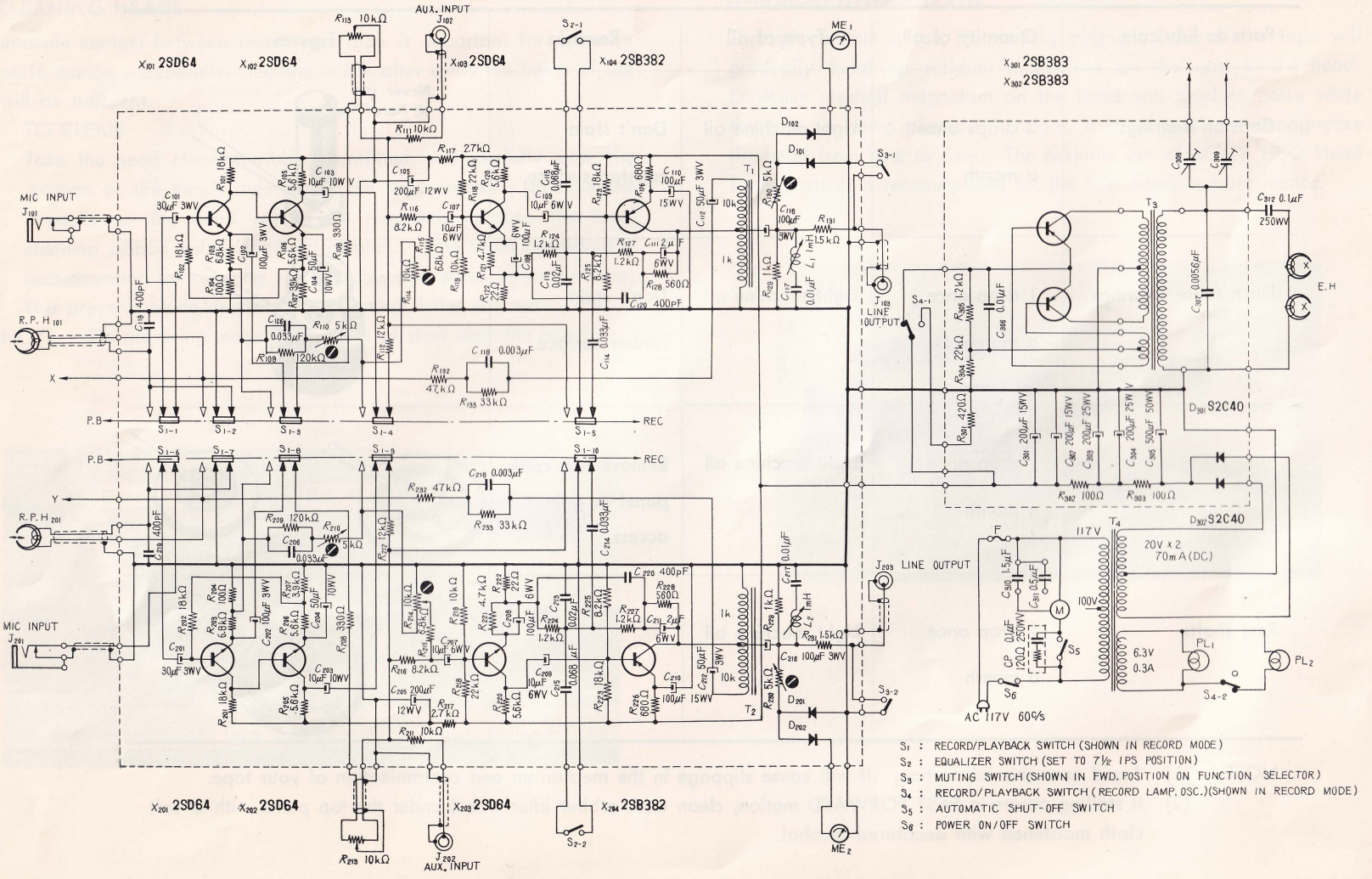


Lubrication Chart

Parts to lubricate	Quantity of oil	Type of oil	Remarks	Figures
Capstan bearings	3 drops once a month	Light machine oil	Don't stain capstan surface.	
Pinch roller bearings	1 drop once a month	Light machine oil	Don't stain rubber surface.	
Idler shafts	1 drop once a month	Light machine oil	Remove top cover panel to gain access.	
Reel shafts	1 drop once a month	Light machine oil		

NOTE: (1) Avoid excessive lubrication. It will cause slippage in the mechanism and contamination of your tape.
(2) If stalling occurs in FAST FORWARD motion, clean each rubber idler wheel under the top panel with a soft cloth moistened with denatured alcohol.

Schematic Diagram



S1 : RECORD/PLAYBACK SWITCH (SHOWN IN RECORD MODE)
S2 : EQUALIZER SWITCH (SET TO 7½ IPS POSITION)
S3 : MUTING SWITCH (SHOWN IN FWD. POSITION ON FUNCTION SELECTOR)
S4 : RECORD/PLAYBACK SWITCH (RECORD LAMP, OSC.)(SHOWN IN RECORD MODE)
S5 : AUTOMATIC SHUT-OFF SWITCH
S6 : POWER ON/OFF SWITCH

Tape Talk

A-B TEST....Direct comparison of sound quality between hi-fi components accomplished by switching from one to another.

ACOUSTIC FEEDBACK....The howling caused when a microphone picks up vibrations from its own speaker system.

AMPLIFY....To increase levels, as with a volume control.

ATTENUATE....To decrease levels, as with a volume control.

AUTOMATIC SHUT-OFF....A special switch on a tape recorder which automatically stops the machine when the tape breaks or runs out.

AZIMUTH ADJUSTMENT....The adjustment to position the head gap exactly perpendicular to the horizontal base of the tape.

BAFFLE....The panel to which most speakers are mounted, usually the front panel of an enclosure.

BIAS....A high frequency alternating current fed into the recording circuit and used as a carrier of the audio signals to the record head, as well as current to the erase head.

BINAURAL SOUND....Two-channel sound, in which each channel recorded is heard only through one ear. (Channel 1—left ear, and Channel 2—right ear.)

BINAURAL MONITOR JACK....Output jack of tape recorder wired to accept binaural earphones.

BULK ERASER....A strong alternating electro-magnetic device used to erase the magnetic patterns on tape while still wound on a reel, or in bulk form.

CAPSTAN....The rotating shaft which engages the tape and pulls it across the heads at constant speed.

CATHODE FOLLOWER....The type of electronic circuit used in an output stage of a recorder to permit the use of longer interconnecting cables without the loss of high frequency. Usually not necessary in a normal installation.

CHANNEL....Complete sound or signal path of a sound system.

CHASSIS....The metal base or frame which carries the electrical or mechanical assemblies.

CPS....Cycles per second.

CROSS TALK....Signal (sound) leakage between two channels.

DECIBEL (ABBREVIATED db)....A relative measure of sound intensity. One db is the smallest change in sound volume that the human ear can detect.

DISTORTION....Any difference between the original sound and the recorded and reproduced sound.

DUAL TRACK RECORDER....Type of monophonic recorder which records or plays back half of a standard $\frac{1}{4}''$ tape in one direction and the other half in the opposite direction.

DUBBING....The art of duplicating on tape.

DYNAMIC MICROPHONE....An electro-magnetic type which employs a moving coil in the magnetic field.

DYNAMIC RANGE....The ratio between the softest and loudest sounds a tape recorder can reproduce without distortion.

EDITING....Selection of certain sections of tape recordings and the deletion of unwanted portions and then splicing them together in the desired sequence.

EQUALIZATION....The manipulation of frequencies that are required to meet the recognized standards of recording and reproducing techniques.

ERASE HEAD....The magnetic assembly on a tape recorder over which the tape passes to remove previously recorded signals.

FAST FORWARD....Provision in a tape recorder to run tape rapidly forward through the machine for quick selection of desired portion.

FEED REEL....The reel on a tape recorder which supplies the tape.

FLAT RESPONSE....Any audio system is specified as having an essentially flat frequency response if it is rated plus or minus 3 db from 50 to 14,000 cps.

FLUTTER....Very short and rapid variations in tape speed.

FOOT SWITCH....A mechanical foot pedal for stopping and starting a tape recorder without the use of hands.

FREQUENCY....The rate of repetition in cycles per second (cps) of musical pitch, as well as of electrical signals. Low frequencies refer to bass tone, high frequencies to treble tone.

FREQUENCY RESPONSE....(See Flat Response.)

FM "Frequency Modulation"....FM broadcasting is characterized by wide range audio response and a great deal of freedom from noise.

FM STEREO....Also known as multiplexing. A form of FM broadcasting in which two channels of audio signals are transmitted on the same carrier, offering a signal similar to the stereo available from stereo records and tapes.

GAIN....The increase in signal provided by an amplifier between input level and output level.

GAP....The tiny distance between the poles of tape heads usually measured in microns.

GROUND....A point in any electrical system that has zero voltage, usually the chassis of any electrical component.

HEAD....An electro-magnetic device across which the tape is drawn and which magnetizes the iron oxide coating of tape.

HEAD ALIGNMENT....In tape recorders, the correct position of the tape head and gap, with respect to the magnetic tape.

HEADPHONES....Small sound reproducers in a suitable frame for wearing about the head. Close coupled to the ears for private listening.

HUM....Low frequency noise in an audio component usually induced from the power line or stray magnetic fields.

IHF....The Institute of High Fidelity, the official association of the manufacturers and certain related organizations in the high fidelity field.

IMPEDANCE....Measured in ohms, it is the AC resistance of any electrical system. Generally referred to as either "high" or "low" impedance. For best results in connecting two components, output and input impedances must match.

IN-LINE HEADS....Arrangement of stereophonic heads on a tape recorder in which the head gaps are mounted one directly above the other. Also called "stacked heads".

INPUT....The receptacle or jack through which a signal is fed into an amplifier.

IPS....Abbreviation for tape speed in inches per second.

INVERTER....A device to change one type of electrical current to another. Frequently used to obtain 110 volts alternating current for operation of a tape recorder in an automobile.

JACK....Receptacle or plug connector leading to the input or output circuit of a tape recorder or other component.

LEVEL INDICATOR....Indicates the level at which the recording is being made and serves as a warning against under recording or over recording. It may be in the form of a neon bulb, "Magic Eye" or a VU meter.

LOUDNESS CONTROL....Sometimes known as "contour". Compensates for loss of tones at the extreme end of the audio range when listening at soft volumes or through small speakers. A typical control of this sort will usually boost the bass.

MAGNETIC TAPE....Usually 1/4" plastic tape which has been coated with an emulsion of iron oxide particles. Used on tape recorders as the recording media and is the highest fidelity of reproduction possible today.

MIL....1/1,000 of an inch. Tape thickness is usually measured in mils.

MIXER....A device by which signals from two or more sources can be combined and fed simultaneously into a tape recorder at the proper level and balance.

MIXING....The blending of two or more signals for special effects.

MONITOR HEAD....The head on a tape recorder which, when connected to the proper circuitry, makes it possible to listen to the material directly off the tape while the recording is being made.

MONOPHONIC RECORDER....Sometimes incorrectly called monaural recorder. It is capable of only one channel recording.

MULTIPLEX....(See FM Stereo.)

NAB CURVE....Standard playback equalization curve set by the National Association of Broadcasters.

OSCILLOSCOPE....A device which forms a graphic representation of an electrical signal on a screen (cathode ray tube). Used for testing and measuring of electrical and electronic equipment (tape recorders).

OUTPUT....The signal voltage coming from components, such as pre-amplifiers and amplifiers. In tape recorders, there are line outputs, speaker outputs and monitor outputs.

OXIDE....As used in magnetic tape—a microscopic ferrous oxide.

PATCH CORD....A short cable with a plug at either end used to interconnect equipment, such as tape recorders and amplifiers.

PHASING....The proper polarity orientation of the two speakers used in stereo playback; proper phasing would be, for example, the ground connection being common to both speakers.

PINCH ROLLER (Pressure Roller)....A rubber roller which engages the capstan and pulls the tape with constant speed and prevents slippage.

PLAYBACK....Reproduction of the sound previously recorded on the tape.

PLAYBACK HEAD....The magnetic head which picks up signals from tape for playback.

PLUG....A form of mechanical interconnector used for quick and easy connection of components, such as phone plug, phono plug and AC plug.

POWER AMPLIFIER....An amplifier designed to operate a speaker system.

POWER CORD....Cable used to connect a tape recorder to AC current.

PRE-AMPLIFIER....An amplifier that boosts extremely weak signal voltages, such as those from microphones, magnetic playback heads or phonograph pickups, to a level that is usable by power amplifiers, and at the same time accomplishes the necessary equalization for industry standards.

PRE-RECORDED TAPES....Recordings on tape that are commercially available.

PRESSURE PADS....Felt pads mounted on arms which hold the magnetic tape in close contact with the heads. Mostly always used in "one-motor" tape recorders.

SIGNAL-TO-NOISE RATIO....The ratio, measured in db's, between the pure sound and the noise induced by the recording system itself.

SOUND-ON-SOUND....A method in which previously recorded material on one track may be re-recorded on another track while simultaneously adding new material.

SPLICING TAPE....A special pressure sensitive non-magnetic tape used for splicing magnetic tape.

STACKED HEADS....(See In-Line Heads.)

STEREOPHONIC SOUND...."Dimensional" sound reproduction achieved through the use of two or more sound tracks recorded through microphones so placed as to provide separation of sounds and heard simultaneously through speakers arranged somewhat apart from each other, according to the size of the room in which it is played.

TAKE-UP REEL....The reel located on the right side of the tape recorder which accumulates the tape as it is recorded or played.

TAPE DECK....A tape recorder designed for use in built-in high fidelity music systems. It is encased in a metal cage rather than a carrying case. The electronics usually consist of record amplifiers and playback pre-amplifier.

TAPE GUIDES....Grooved metal posts located on either side of the head assembly to keep the tape tracking properly across the heads.

TAPE INDEX COUNTER....A digital counter used mostly to aid in referring to a particular portion of tape.

TAPE SPEED....The speed at which tape moves past the heads and measured in inches per second.

TAPE SPLICER....A semi-automatic or automatic device used for splicing tape.

TAPE TRANSPORT....The mechanical portion of the tape recorder mounted with motors, reel spindles, heads and controls. It does not include pre-amplifiers, power amplifiers, speakers or carrying case.

TONE CONTROL....Used to vary bass and treble response to achieve individually desired balance of tone.

VU METER....A volume unit meter which indicates the relative levels of sounds being recorded.

WOW....Repetitive slow variations in tape speed.

SONY®

WARRANTY

WARRANTY

This Sony Recorder is fully guaranteed for a period of ninety days from date of purchase, provided such purchase is made from an authorized Superscope distributor or dealer.

This Warranty entitles you to Free Service as well as Free Parts Exchange, provided you have mailed the Warranty Registration Card to Superscope Inc., Sun Valley, California within ten days after date of purchase. If it is necessary for you to send this Recorder or any defective part to Superscope Inc., all shipments must be prepaid. If your requested repairs or parts exchange are within the terms of this Warranty, Superscope will prepay return shipping charges, provided it is addressed within the continental limits of the United States. This Warranty is void if the Serial Number has been altered or removed.

This Warranty shall not apply if the instrument has not been connected or operated in accordance with the instructions furnished by Sony and Superscope.

This Warranty shall also be voided if the instrument has been altered or repaired in any way that Superscope believes has affected the stability or reliability of the instrument.

To protect your rights under this Warranty fill out and mail the Warranty Registration Card to Superscope within 10 days of your purchase date. This Warranty is in lieu of all others expressed or implied.

The Sony Corporation and/or Superscope Inc. reserves the right to make changes in design and improvement upon its products without any obligation to install these changes upon any of its products theretofore manufactured.

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